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ber of pollen tubes in various portions of the style at any given time after pollination.

Though a lateral displacement of the pollen tubes results from the flattening of these strands of conducting tissue, every pollen tube is practically in place with reference to its distance from the stigma or ovary. By means of a microscope equipped with a mechanical stage it was found possible to count their number and measure their distance from the end of the stigma, down as far as they had penetrated, from which their curves of distribution could be plotted and studied.

In the adjoining diagram the pollen tube distribution curves were made by superposing the pollen tube counts of a dozen or more styles whose foremost pollen tubes had penetrated to about 42 mm. The counts were made for 2mm. intervals and this represents their distribution about fourteen hours after pollination under fairly uniform temperature conditions—approximately 20°C. The bi-modal curve is for Globes selfed and represents a total of 8,365 pollen grains applied to 18 stigmas under similar conditions, while the curve of distribution for selfed normal plants is shown superposed on this and represents 4,691 pollen grains applied to 11 different stigmas. In the normals the germination was 95.6 per cent. while the Globe pollen selfed gave a germination of 94.9 per cent. The curves are much more jagged when the pollen tube populations from individual styles are plotted but those from Globes are quite as characteristically bi-modal.

The explanation offered is that though the Globe pollen selfed germinates about as well as the normal pollen selfed, there are slower growing pollen tubes among the rapidly growing ones and soon this population of gametophytes becomes resolved into two groups which grow at slightly different rates. This bi-modal character increases with time, and the slowest pollen tubes may fail to fertilize because they fail to enter the ovary before abscission of the style, or they may fail only because the ovules were already fertilized by the more rapid pollen tubes. Since the Globe character is only slightly transmitted through the pollen, we infer that the pollen tubes with

$(n+1)$ chromosomes are the slow ones, while the tubes with n chromosomes are those in the lead.

While this study is very largely still in its preliminary stages, it seems to show that we have in *Datura* a selection between gametophytes, one of the special forms of Developmental Selection described by one of us (4), thus proving that this form of selection is subject to experimental study. The result of our preliminary study also shows that the Globe, as well as the other $(2n+1)$ mutants of *Datura*, illustrates a condition in which the mutations tend to disappear because they are not favored by the processes of Developmental Selection.

LITERATURE CITED

1. Blakeslee, A. F., 1922; Variations in *Datura* due to changes in chromosome number. *American Naturalist*, 56: 16-31, Jan.-Feb.
2. ———, 1921; The Globe Mutant in the Jimson weed (*Datura Stramonium*). *Genetics*, 6: 241-264, May.
3. Blakeslee, A. F., John Belling and M. E. Farnham, 1920; Chromosomal duplication and Mendelian phenomena in *Datura* mutants. *SCIENCE*, N. S., 52: 388-390, Oct. 22.
4. Buchholz, J. T., 1922; Developmental Selection in vascular plants. *Bot. Gaz.*, 73: 249-286, Apr.

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THE MATHEMATICAL ASSOCIATION OF AMERICA

The sixth annual meeting of the Mathematical Association of America was held at the University of Toronto on Thursday and Friday, December 29 and 30, 1921. One hundred and ten were in attendance at the sessions of the association, 88 of these being members of the association. The following papers were read at the meeting aside from the papers by Professors Carmichael, Curtiss and Slaughter on the program of the joint sessions with the American Mathematical Society, and Section A of the American Association:

Outlines of Certain Fields of Research:

(a) "Foundations of geometry," by Professor Oswald Veblen, Princeton University.

(b) "Calculus of variations," by Professor G. A. Bliss, University of Chicago.

(It is frequently urged that college and university teachers should be engaged in some form of productive work, but many college instructors do not know promising lines of investigation and do not know how, and where to find the literature which will inform them what has already been done in various lines. A suggestion has been made that the Association can do a valuable service if on its programs and through the *American Mathematical Monthly* university teachers map out for college teachers possible lines of research growing readily out of college courses. These papers afford a beginning of such suggestions.)

"Courses in mechanics for students majoring in mathematics," by Professor E. V. Huntington, Harvard University.

"Topology of three-dimensional manifolds in three dimensions," by Professor Norman Miller, Queen's University.

"Functionality in mathematical instruction in schools and colleges," by Professor E. R. Hedrick, University of Missouri.

"An example in the inversion of upper limits and bounds," by Professor Samuel Beatty, University of Toronto.

"New mathematical periodicals," by Professor G. A. Miller, University of Illinois.

"Proof of the fundamental theorem regarding the length of a curve," Professor J. L. Synge, University of Toronto, by invitation.

At the business meeting the following officers for 1922 were elected:

President: R. C. Archibald, Brown University.

Vice-presidents: R. D. Carmichael, University of Illinois, and B. F. Finkel, Drury College.

Trustees: L. P. Eisenhart, Princeton University; E. V. Huntington, Harvard University; D. N. Lehmer, University of California; G. A. Miller, University of Illinois; E. J. Wilczynski, University of Chicago.

The trustees elected to membership 58 individual members and 4 institutional members.

The financial report indicated an estimated surplus of \$240 on the year's business.

The full proceedings of the meeting were published in the *Monthly* for March, 1922.

W. D. CAIRNS,
Secretary-Treasurer

THE AMERICAN MATHEMATICAL SOCIETY

THE twenty-eighth annual meeting of the society and the forty-eighth regular meeting of the Chicago section were held at the University of Toronto on Wednesday and Thursday, December 28-29, in affiliation with the meetings of the American Association for the Advancement of Science. The regular sessions of the society were held on Wednesday, President Bliss occupying the chair, relieved by Professors P. F. Smith and C. N. Haskins. On Thursday morning there was held a joint session with Sections B and C of the American Association and the American Physical Society, and on Thursday afternoon a joint session with Section A and the Mathematical Association of America. The attendance included 84 members. At the meeting of the council on Wednesday, 61 persons were elected to membership in the society.

At the annual election the following officers and other members of the Council were chosen: *Vice-presidents*, R. D. Carmichael and D. E. Smith; *secretary*, R. G. D. Richardson; *treasurer*, W. B. Fite; *librarian*, R. C. Archibald; *committee of publication*, E. R. Hedrick, W. A. Hurwitz, J. W. Young; *members of the Council*, to serve until December, 1924, J. W. Alexander, Henry Blumberg, L. L. Dines, F. R. Sharpe.

The total membership of the society is now 1,005, including 85 life members. The total attendance of members at all meetings, including sectional meetings, during the past year was 420; the number of papers read was 175. At the annual election 169 votes were cast. The treasurer's report shows a balance of \$10,604.22, including the life membership fund of \$7,528.87. Sales of the society's publications during the year amounted to \$3,222.16. The library now contains 6,014 volumes, excluding 500 unbound dissertations.

The program of the joint session of Thursday morning was as follows:

I. Atomic nuclei and extra-nuclear electronic configuration, by Professor J. C. McLennan, retiring vice-president of Section B.

II. Symposium on quantum theory: for Section C, Dr. R. C. Tolman; for the American Mathematical Society, Professor H. B. Phillips; for